Deepwater Horizon/Mississippi Canyon 252 Oil Spill
Sampling and Analysis Plan for
Jean Lafitte National Historic Park and Preserve
Submerged Aquatic Vegetation
Natural Resource Damage Assessment

Prepared for:

The National Park Service
Environmental Quality Division
P.O. Box 25287
Denver, CO 80225-0287

and

Submerged Aquatic Vegetation Technical Working Group

September 2010

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Approval of this work plan is for the purposes of obtaining data for the Natural Resource Damage Assessment. Each party reserves its right to produce its own independent interpretation and analysis of any data collected pursuant to this work plan.

This plan will be implemented consistent with existing trustee regulations and policies. All applicable state and federal permits must be obtained prior to conducting work.

Unless otherwise agreed upon by the Trustees and BP, all samples will be sent to TDI Brooks Lab.

Each laboratory shall simultaneously deliver raw data, including all necessary metadata, generated as part of this work plan as a Laboratory Analytical Data Package (LADP) to the trustee Data Management Team (DMT), the Louisiana Oil Spill Coordinator's Office (LOSCO) on behalf of the State of Louisiana and to BP (or ENTRIX behalf of BP). The electronic data deliverable (EDD) spreadsheet with pre-validated analytical results, which is a component of the complete LADP, will also be delivered to the secure FTP drop box maintained by the trustees' Data Management Team (DMT). Any preliminary data distributed to the DMT shall also be distributed to LOSCO and to BP (or ENTRIX on behalf of BP). Thereafter, the DMT will validate and perform quality assurance/quality control (QA/QC) procedures on the LADP consistent with the authorized Quality Assurance Project Plan, after which time the validated/QA/QC'd data shall be made available simultaneously to all trustees and BP (or ENTRIX on behalf of BP). Any questions raised on the validated/QA/QC results shall be handled per the procedures in the Quality Assurance Project Plan and the issue and results shall be distributed to all parties. In the interest of maintaining one consistent data set for use by all parties, only the validated/QA/QC'd data set released by the DMT shall be considered the consensus data set. In order to assure reliability of the consensus data and full review by the parties, no party shall publish consensus data until 7 days after such data has been made available to the parties. Also, the LADP shall not be released by the DMT, LOSCO, BP or ENTRIX prior to validation/QA/QC absent a showing of critical operational need. Should any party show a critical operational need for data prior to validation/QA/QC, any released data will be clearly marked "preliminary/unvalidated" and will be made available equally to all trustees and to BP (or ENTRIX on behalf of BP)."

Except as explicitly stated herein, by signing this Plan, the Parties make no admission of fact or law.

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ABBREVIATIONS AND ACRONYMS

ºC	degrees Celsius
cm	centimeters
COC	chain of custody
DO	dissolved oxygen
HCL	hydrochloric acid
FTP	file transfer protocol
GPS	global positioning system
ID	identification
JELA	Jean Lafitte National Historic Park and Preserve
L	liter
mg/L	milligram per liter
mL	milliliter
MC 252	Deepwater Horizon/Mississippi Canyon 252
MLLW	mean lower low water
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRDA	Natural Resource Damage Assessment
PAH	polynuclear aromatic hydrocarbon
PAR	photosynthetically active radiation
PPT	parts per thousand
QA/QC	quality assurance/quality control
QAP	quality assurance plan
SAV	submerged aquatic vegetation
SM	standard methods
SOP	standard operating procedure
TN	Total Nitrogen
TP	Total Phosphorous
TWG	Technical Working Group
TOC	total organic carbon
VOC	volatile organic compound

1.0 INTRODUCTION

During the response to the Deepwater Horizon/Mississippi Canyon 252 (MC 252) Oil Spill, Mississippi River freshwater flows were diverted from the Davis Pond Diversion to Lake Cataouatche which is adjacent to Jean Lafitte National Historical Park and Preserve (JELA) to reduce the potential for oil intrusion into the inland marshes. As a result, the submerged aquatic vegetation (SAV) community at JELA may be impacted by the increase in freshwater, as well as nutrients, into the interior marshes. Potential effects of increased freshwater and nutrients include eutrophication and diminished water quality, including reduced dissolved oxygen (DO) levels which may result in reductions in the diversity and abundance of SAV species and proliferation of nuisance or harmful algal blooms. This document presents a work plan detailing methods for assessments of freshwater SAV habitat following the diversion of Mississippi River water into JELA during the response to the MC 252 Oil Spill. The standard operating procedures (SOPs) target ephemeral data that are anticipated to change or disappear within a relatively short period of time. 15 C.F.R. §990.43

1.1 Sampling and Testing Objectives

The purpose of the study is to assess the potential impacts of the increased freshwater inputs into JELA due to the diversion of Mississippi River freshwater into JELA following the MC 252 Oil Spill. The National Park Service (NPS) has requested that the field surveys of JELA be conducted in September 2010. Surveys will include assessments of SAV species composition and relative cover at 36 locations within the northeast portion of the Barataria Estuary in JELA and 5 locations within reference sites located north of the Davis Pond Diversion, which were not subjected to increased freshwater intrusion, including areas within Lac and Bayou Des Allemandes and associated channels. Determination of the number of stations was based on statistical guidance from the EPA's *Guidance for the Data Quality Objectives Process* (EPA, 2006a) and EPA's *Data Quality Assessment: Statistical Methods for Practitioners* (EPA, 2006b).

At a subset of the JELA sample locations (i.e., ten), physical water quality parameters will be quantified and surface water, sediment, and SAV tissue samples will be collected for chemical analyses, including polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs) and nutrients (total nitrogen [TN] and total phosphorous [TP] within water and sediment. Determinations of the relative abundance and distribution of native, exotic, and nuisance SAV, as well as macroalgae, will be performed using methods consistent with the June 2006 through April 2008 SAV surveys of 146 locations conducted within JELA by Poirrier et al. (2009). Sediment, water, and tissue sampling for analyses of PAHs will follow established procedures provided by the SAV Technical Working Group (TWG) in the Mississippi Canyon 252 Incident SAV Tier 1 Pre-Assessment Plan Pre-Impact Baseline Characterization (Tier 1 Plan). Nutrient analyses will be performed to measure the levels of nitrogen and phosphorous in the study area.

2.0 FIELD COLLECTION PROTOCOL FOR SAV CURRENT CONDITIONS DETERMINATIONS

Surveys will be conducted aboard shallow-draft vessels, which will allow access to SAV throughout JELA. A field crew including a field lead familiar with the SAV survey protocols and local species; two field scientists with experience in SAV surveys, water quality sampling, and chemical sampling; a boat operator knowledgeable of JELA is anticipated to complete surveys over a six-day period. While it is not mandatory for a responsible party representative to be present during all field activities, the responsible party has the option to have representatives attend and observe field activities.

2.1 Sample Locations

Ten sampling locations within the northeastern portion of the Barataria Estuary in JELA will be surveyed for SAV; physical water quality parameters; and water, sediment, and SAV tissue chemistry, including PAHs, VOCs, TN, and TP. Sample locations were selected from locations previously assessed by Poirrier et al. (2009). Twenty-six additional sample locations will be assessed for SAV alone (Table 1, Figure 1). The 26 additional sample locations also were randomly selected from locations previously surveyed by Poirrier et al. (2009) with adjustments made for known access limitations. Sample locations were positioned in areas of JELA that have been previously found to support SAV, including the lake shorelines and inland channels with varying potentials for exposure. Additionally, five reference stations located within areas north of the Davis Pond freshwater diversion will be surveyed for SAV, physical water quality parameters, water and sediment nutrient chemistry (TV and TP) (Figure 2). Sample locations are defined to be areas of approximately 30 m^2 in areas along shorelines with SAV.

Table 1. Sample Location and Target Objectives.

Site	Water Body	Latitude	Longitude	Water, Sediment, & Tissue Sample[1]	SAV Assessment	Physical Water Quality	Photo and GPS Documentation
1	Bayou Segnette	[redacted]4	[redacted]	X	X	X	X
2	Tarpaper Canal	[redacted]	[redacted]	X	X	X	X
3	Parallel Canal	[redacted]	[redacted]	X	X	X	X
4	Pipeline Canal	[redacted]	[redacted]	X	X	X	X
5	Lower Kenta Canal	[redacted]	[redacted]	X	X	X	X
6	Bayou Segnette Waterway	[redacted]	[redacted]	X	X	X	X
7	Bayou Segnette Waterway	[redacted]	[redacted]	X	X	X	X
8	Lake Salvador	[redacted]	[redacted]	X	X	X	X
9	Bayou Bardeaux	[redacted]	[redacted]	X	X	X	X
10	Lake Cataouatche	[redacted]	[redacted]	X	X	X	X
11	Horseshoe Canal	[redacted]	[redacted]		X		X
12	Horseshoe Canal	[redacted]	[redacted]		X		X
13	Bayou Boeuf	[redacted]	[redacted]		X		X
14	Tarpaper Canal	[redacted]	[redacted]		X		X
15**b**	Pipeline Canal	[redacted]	[redacted]		X		X
16b	Bayou des Familles	[redacted]	[redacted]		X		X
17	Kenta Canal	[redacted]	[redacted]		X		X
18	Kenta Canal	[redacted]	[redacted]		X		X
19	Pipeline Canal	[redacted]	[redacted]		X		X
20b	Lake Salvador	[redacted]	[redacted]		X		X
21	Lake Salvador	[redacted]	[redacted]		X		X
22	Lake Cataouatche	[redacted]	[redacted]		X		X
23	Lake Cataouatche	[redacted]	[redacted]		X		X
24	Lake Cataouatche	[redacted]	[redacted]		X		X
25	Tarpaper Canal	[redacted]	[redacted]		X		X
26**b**	Kenta Canal	[redacted]	[redacted]		X		X
27	Bayou	[redacted]	[redacted]		X		X

Site	Water Body	Latitude	Longitude	Water, Sediment, & Tissue Sample[1]	SAV Assessment	Physical Water Quality	Photo and GPS Documentation
	Segnette Waterway						
28	Parallel Canal	[redacted]	[redacted]		X		X
29	Kenta Canal	[redacted]	[redacted]		X		X
30	Pipeline Canal	[redacted]	[redacted]		X		X
31**b**	Lake Salvador	[redacted]	[redacted]		X		X
32	Lake Salvador	[redacted]	[redacted]		X		X
33	Bayou Bardeaux	[redacted]	[redacted]		X		X
34	Davis Marrero Canal	[redacted]	[redacted]		X		X
35	Yankee Pond	[redacted]	[redacted]		X		X
36	Lake Cataouatche	[redacted]	[redacted]		X		X
R1	Canal at Lac des Allemands	[redacted]	[redacted]	X	X	X	X
R2	Lac des Allemands	[redacted]	[redacted]	X	X	X	X
R3	Lac des Allemands	[redacted]	[redacted]	X	X	X	X
R4	Canal at Lac des Allemands	[redacted]	[redacted]	X	X	X	X
R5	Canal at Lac des Allemands	[redacted]	[redacted]	X	X	X	X

[1] Only water and sediment samples will be collected for nutrient analyses at reference locations.

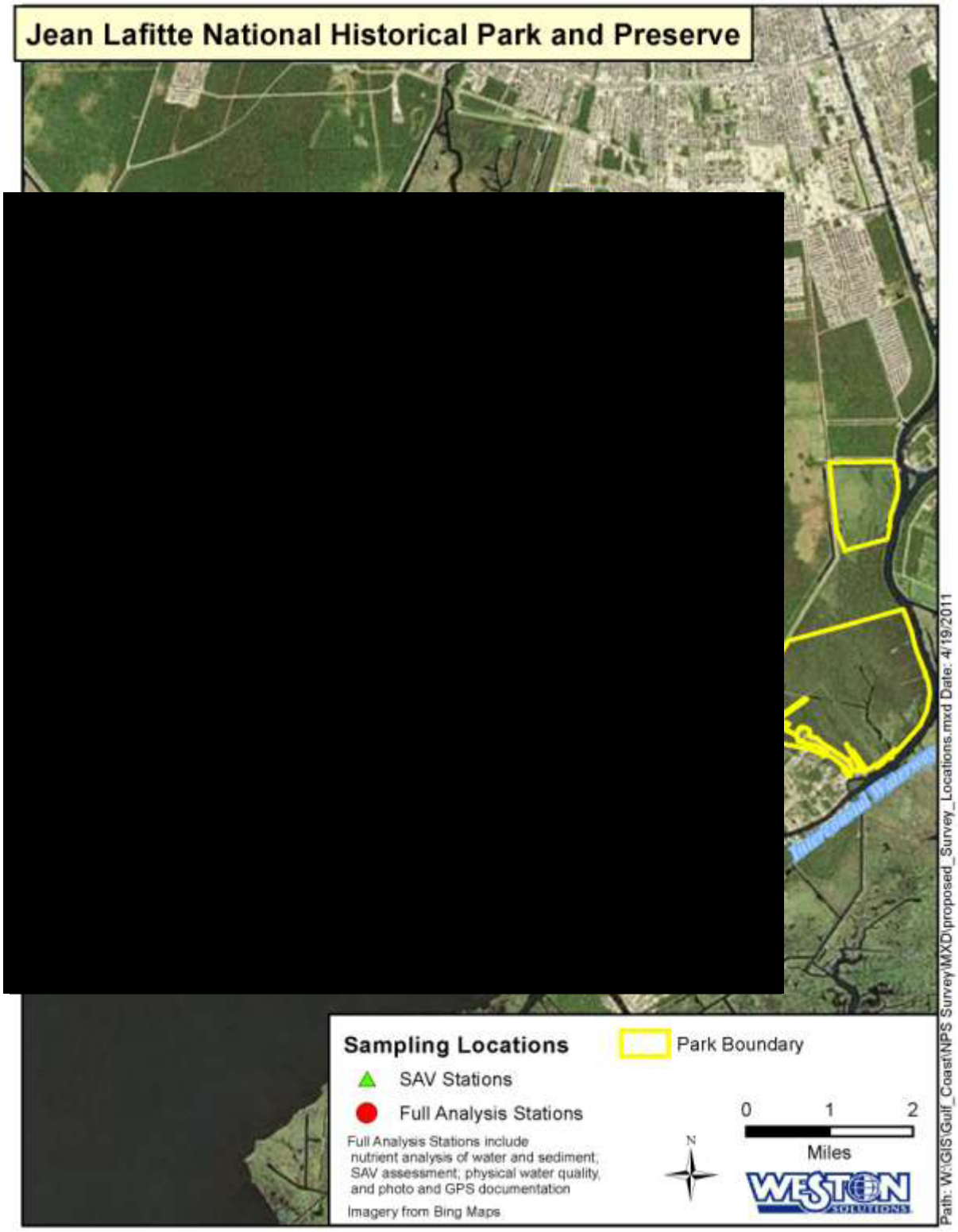


Figure 1. Jean Lafitte National Historical Park and Preserve Study Area and Sampling Locations

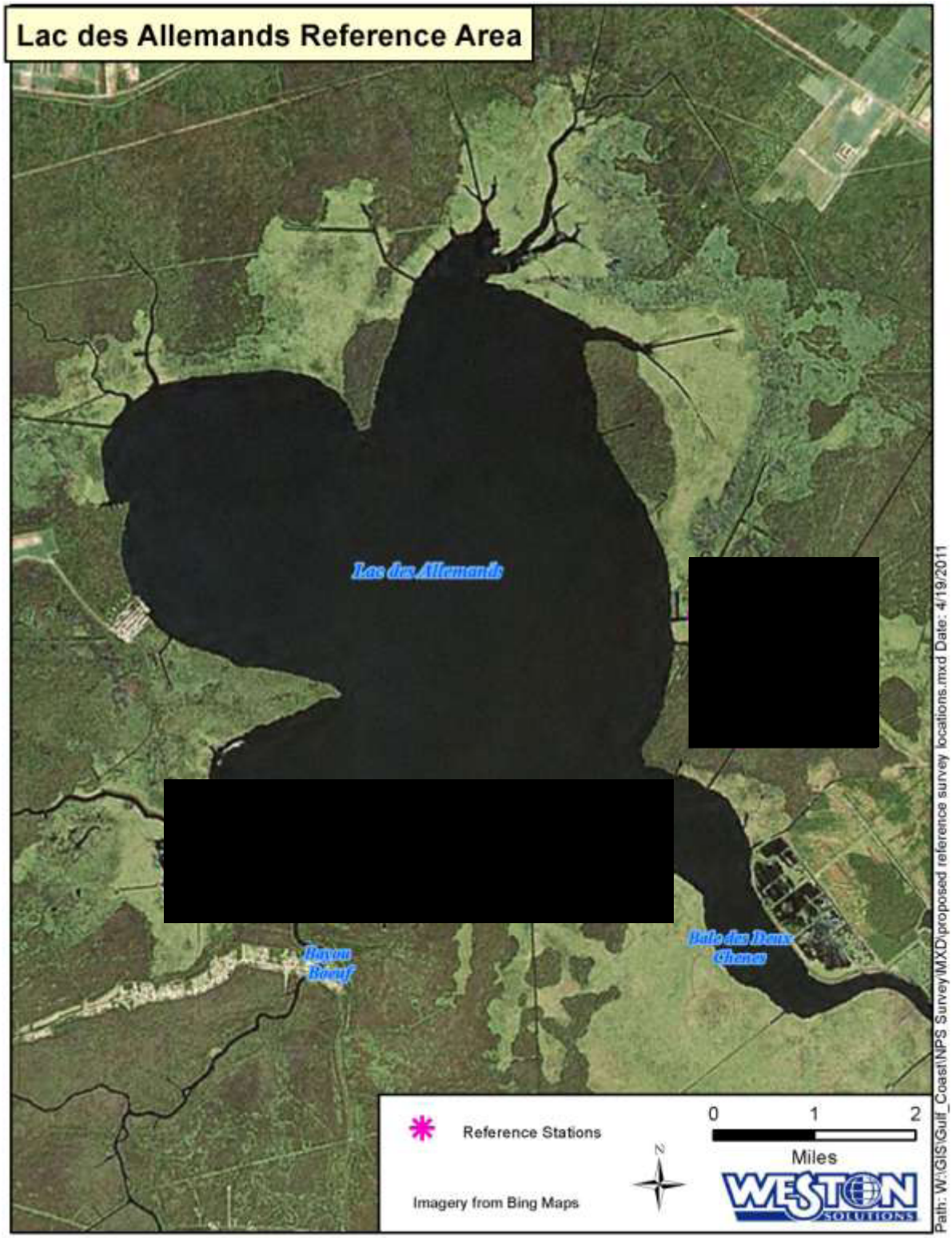


Figure 2. Lac des Allemands Reference Sampling Locations

2.2 Overview of Site Assessment Protocols

The field crew will perform site assessments consistent with the following protocols:

1. The location of the sample site will be recorded by taking a GPS way point, recording the latitude and longitude of the site on appropriate forms, and a photograph of the GPS unit will be taken to record the location at all sampling locations.
2. Photographs of the approximately 30-m^2 site will be taken to record the overall condition of the site and presence of SAV, and general notes on SAV will be recorded in field forms at all sampling locations.
3. Water quality and water chemistry sampling will be performed prior to SAV surveys and sediment samplings to limit suspension of sediments at the site at the targeted sampling locations.
4. SAV assessments will be performed to determine presence and relative abundance of species at all sampling locations.
5. SAV tissues will be collected for chemical analyses at the targeted sampling locations.
6. Sediment samples will be collected for chemical analyses at the targeted sampling locations.

2.3 Sampling Equipment

Sampling equipment for SAV surveys will include:

- Study area maps with pre-determined sampling points;
- Hand-held global positioning system (GPS) unit with an extra set of batteries;
- Digital camera and extra set of batteries for visual observations;
- Water proof notebooks, water proof pens, and waterproof forms (SAV site characterization forms, chain-of-custody, NRDA sample collection forms for both tissue and sediments, and photologger form) (modified SAV data sheets for JELA are provided in Appendix A);
- Rake for deeper SAV that may not be apparent at the surface;
- 0.25-m^2 quadrats; and
- Meter stick or weighted transect tape that may be used to measure water depth (in the event that the vessel is not fitted with a depth sounder).

Water quality sampling equipment will include:

- Secchi disk and line;
- Photosynthetically active radiation (PAR) sensor with datalogger (LICOR spherical sensors, one for air one for water, and LICOR 1400 datalogger, or equivalent setup);
- YSI 6920 sonde with sensors for dissolved oxygen, turbidity, pH, salinity, and temperature.

Water chemistry samples will be collected in:

- one-liter amber glass containers, certified-clean organic-free (solvent rinsed), with Teflon- or aluminum foil-lined lids (for PAHs);
- 10-mL glass vials with Teflon septa (for water volatile organic compounds [VOCs]); and

- 60 mL high-density polyethylene (HDPE) sample bottles.

Sediment sampling equipment will include

- Ponar grab for sediment samples and
- Powdered Alconox ™ detergent and deioinized water for cleaning the Ponar grab between sampling locations.

Sediment chemistry sample containers will include:

- 500-mL (16-oz) or 250-ml (8-oz) glass jars certified-clean to be organic-free (solvent rinsed), with Teflon-lined lids(for sediment chemistry samples);
- 250-mL (8-oz) glass jars for nutrient samples; and
- 125-mL (4-oz) glass jars or sealable plastic bags for grain size samples;

SAV tissue samples will be placed in 250-mL (8-oz) wide-mouth glass jars.

2.4 Site Characterization

2.4.1 GPS Locations

The site name (general geographic location or established sampling area) along with latitude and longitude obtained via a GPS will be noted. The field crew will record coordinates in decimal degrees with WGS84 as the datum and take a waypoint with the GPS unit. The field crew will also take a photograph of the GPS unit, with the latitude and longitude coordinates visible.

2.4.2 Photographs

The field crew will adhere to the following procedures:

Set up the camera in accordance with NRDA Field Photography Guidance (NRDA_Field_Photographpy_Guidance.doc, available on the case file transfer protocol [FTP] site). **Always begin by taking a photo of the operating GPS screen showing the date and time to synchronize the photos with the GPS track.**

Take photographs of the site and sample collection itself if possible; make sure each photograph or series can be later associated with the corresponding sampling locations (e.g., through use of GPS Photolink software or by keeping a detailed photo log). Do not delete or alter any photographs, the numbering sequence of photos uploaded from your camera must not have any gaps (see separate NRDA Field Photography Guidance).

Enter all photographs into the **National Oceanic and Atmospheric Administration (NOAA) NRDA Trustees Sampler Photo Logger Form**. Follow all required Chain of Custody (CoC) procedures, as indicated in the data management CoC training session. Original photo files must either be left on flash cards and placed in locked storage or uploaded to a hard drive and not opened. A copy can be made of the original, and the copy may then be opened.

2.5 Water Quality and Chemistry Assessments

Following initial assessment of the site to establish the presence of SAV and completion of the Site Characterization, the field crew will complete water quality assessments and collect discrete water samples for chemical analysis. Water quality assessments will be completed first to avoid suspension of sediments within the water column to the extent practicable.

2.5.1 Water Quality Observations

The field crew will adhere to the following procedures:

Measure light penetration (i.e., Secchi depth) using a Secchi disk, a round black and white weighted disc (20 cm) that is lowered through the water until the distinction between white and black quadrants is no longer visible to the human eye. The disk is attached to a non-stretching rope, marked at appropriate intervals (5 and/or 10 cm apart). The observer lowers the disk over the side of the boat facing the sun and not in the shadow of the vessel, until the disk disappears, then raises it until it reappears and records this depth. At the time of the measurement record the time of day, cloud cover, and wave height. Do not wear sunglasses when taking the measurement and perform the assessment outside the shadow of the vessel, ideally on the sunward side.

Light attenuation in the water can be calculated using either a 2 pi or 4 pi quantum sensors attached to a data recorder. The sensor is lowered in the water column to obtain a profile of light readings. A sub-surface reading is taken just below the water surface and then at least three additional readings with depth down to the bottom. Readings are taken at closer intervals near the surface to capture higher rates of light attenuation. For each depth, record the irradiance value displayed on the data logger. At the time of the measurement record the time of day, cloud cover, and wave height. Do three profiles per station.

For calculating light attenuation in each profile take the natural log of the irradiance values and regress light on depth. The attenuation coefficient is the absolute value of the slope of the line. Note: The sensor should be wrapped in clear plastic wrap if oil is observed within the project area.

Water quality measurements will also be collected for dissolved oxygen recorded in milligrams per liter (mg/L), salinity recorded in parts per thousand (ppt), conductance measured in Siemens, and temperature recorded in degrees Celsius (ºC) using a YSI 6920 sonde. All values will be recorded onto the SAV site characterization form.

2.5.2 Water Chemistry Sampling

The field crew will adhere to the following procedures:

Water samples will be collected approximately within the middle of the 30-m^2 sample location. Water chemistry samples will be collected (wearing clean nitrile or other non-contaminating gloves) directly into the sample container to minimize risks of cross-contamination. Water samples for PAH analysis will be collected in 1-L glass sampling containers with Teflon-lined

lids, certified clean for semi-volatile analysis. Amber glass is preferred to reduce light exposure, but not required. Leave headspace of about 1 inch; do not leave for prolonged periods in the light.

To collect VOC samples, prior coordination with the receiving lab is recommended. Typically, 40-ml VOC vials preserved with 0.2 ml hydrochloric acid (HCl) should be obtained in advance from the lab; if not possible, obtain from a supplier that certifies them clean and pre-preserved for volatile analysis. When collecting VOC sample, fill vials so that they have no headspace or air bubbles remaining after lid is replaced. If oil or sheen is present, decontaminate everything that contacts the oil or sheen after each collection. Wash with laboratory-grade detergent and clean water, with a triple clean water rinse (distilled water from a local store is sufficient).

Water samples for TN and TP analyses will be collected in 60 mL high-density polyethylene (HDPE) sample bottles. Bottles will be half filled before affixing the cap and placed on ice.

Collect subsurface samples to characterize constituents present in particulate and/or dissolved state in the water column. Do not take samples from water surface to characterize water column concentrations. Containers for subsurface samples must be deployed and retrieved with the lid sealed so that the sample does not inadvertently include water surface constituents. Remove and replace the lid only at the sampling depth.

- Field duplicates will be clearly marked and will be assigned a new sample number distinct from the original duplicated sample. On the sample form, use the 'Sample QA/QC Type' column to indicate that the sample is a duplicate. The associated parent sample number can be identified in the Sample Notes column (the entire Sample ID should not be required in most situations since the location ID, matrix, and data should be the same).
- If collecting a replicate water sample at each location, which may be recommended as a backup in case of breakage or loss of containers during shipment and handling, both containers will receive the same sample ID (label the first container, "XYZ...1 of 2" and the 2nd container, "XYZ...2 of 2") and both will be entered on the same line on the CoC form.
- Affix sample ID labels to each container and cover with clear tape wrapped around the entire container circumference.

2.6 SAV Characterization

Characterization of the SAV will include an initial visual assessment of presence of SAV species, visual estimations of the relative abundance of species using percent cover, and SAV tissue sample collection for chemical analyses. Photographs will be taken documenting SAV cover at each station.

2.6.1 SAV Assessment of Species Relative Abundance

The waters within JELA range from freshwater to low-salinity, brackish-water and have been found to support ten SAV species (Poirrier et al. 2009). Of the ten, seven were determined to be native species: *Cabomba caroliniana*, *Ceratophyllum demersum*, *Heteranthera dubia*, *Najas*

guadalupensis, *Potamogeton pusillus*, *Vallisneria Americana*, and *Zannichellia palustris*, and three were exotics: *Egeria densa*, *Hydrilla verticillata*, and *Myriophyllum spicatum*. Photographs of the SAV species known to occur in JELA are provided in Appendix B.

The field crew will adhere to the following procedures:

A representative sampling site will be chosen at each of the designated sample locations. Sample sites will be confined to an approximately 30-m^2 area positioned in areas with SAV in proximity to the shoreline. The habitat setting of the SAV bed will be indicated on field forms. The habitat setting is a reference to the tidal regime the bed normally experiences (intertidal or subtidal). If the bed is located subtidally, indicate the depth at the time of sampling, in meters. Additionally, the location of the SAV beds in the canal, pond, or lake shore habitat will be described

SAV characterizations will be performed in accordance with the methods of "An Inventory and Assessment of the Distribution of Submersed Aquatic Vegetation at Jean Lafitte National Historical Park and Preserve" (Poirrier et al. 2009). Sampling methods will include surface observations from the boat to determine the presence and relative cover of SAV species, as follows:

- Percent surface cover of the total SAV bed will be determined by direct measure, and minimum and maximum colonization depth measured. Maximum site depth will also be measured.
- SAV species composition of the bed will be determined, percent cover of dominant species estimated and species ranked in order of abundance.
- Floating aquatic plants and surface algae associated with beds and relative abundance noted.
- General observations of SAV abundance in areas between sampling sites will be made and any major differences from the previous 2009 Poirrier et al. study noted.
- Percent surface cover will also be assessed at sampling sites using a variant of the Braun/Blanquet quadrat assessment method, which provides a quantitative assessment of species composition and overall bed density and is often used along a transect running through an SAV bed from closest shore limit to the deep edge, where evaluation is done at specific intervals (5, 10 meters, for example). Percent surface cover will be evaluated within three quadrats at sampling points located along a gradient of increasing depth, where such a gradient exists. Within channels with limited depth gradients, quadrats will be positioned in areas where SAV is observed to occur.

Additionally, raking of the bottom will be used to locate vegetation not visible from the surface. Digital photography will be used to document plants present and representative voucher specimens will be collected as needed to confirm species identifications. The presence of any flowering shoots also will be quantified and recorded.

2.6.2 SAV Tissue Chemistry Sample Collection

The field crew will adhere to the following procedures:

Vegetation samples will be collected from all species of SAV encountered at the site. Vegetation samples for hydrocarbon analysis will be collected in 250-mL (8-oz) wide-mouth glass jars (certified clean to be organic free). The minimum target sample volume for vegetation is 30

grams (wet weight) although 50 grams is desirable. If the jars are filled approximately 3/4 full the minimum volumes are assuredly achieved. Composite a sufficient number of individuals to fill the sample jars approximately 3/4 full. Excess sediment adhered to vegetation should be physically removed or avoided to the degree practical. Immediately place all samples in a cooler and store at approximately 4ºC.

Sampling using glass jars is preferred; however, if necessary, pre-cleaned aluminum foil and plastic Ziploc bags can be used instead of glass jars. Each vegetation sample should be photographed and the species recorded.

2.7 Sediment Sampling

The field crew will adhere to the following procedures:

Sediment samples will be collected approximately within the middle of the 30-m^2 sample location. All non-disposable sampling gear will be decontaminated before using and between sampling stations. Wash with laboratory-grade detergent (Alconox) and then rinse well with clean deionized water. Lower and retrieve the Ponar grab sampling device at a controlled speed of ~1 foot per second. The device should contact the bottom gently; only its weight or piston mechanism should be used to penetrate the sediment. It is important to minimize disturbance to the surface flocculence, which is likely to contain the oil contaminants, if present.

On retrieval, inspect the sample to make sure that it meets the following criteria: the sampler is not overfilled and the sediment surface is not pressed against the sampler top. A sample is deemed as good if overlying water is present, indicating minimal leakage and subsequent loss of flocculent material; sediment surface is undisturbed, indicating lack of channeling or sample washout; and the desired penetration depth is achieved (e.g., 4-5 centimeters [cm] for a 2 cm sample).

Siphon or drain off the overlying water in the sampler until the sediment is exposed, paying special attention to retain the surface flocculence. Wearing nitrile or other non-contaminating gloves and using any appropriate clean scoop, meticulously collect just the top 2-cm layer, avoiding sediments in contact with the sides or top of the sampler. To avoid cross-contamination, use a clean scoop for each sample. Onboard a sampling vessel, be aware of contamination sources (exhaust fumes, engine cooling systems, oily surfaces). Work up-wind of any exhausts. Segregate dirty/clean areas. Lay out clean substrates to work on and replace frequently. Immediately place all sediment samples in a cooler and keep on ice. Grain size samples should only be refrigerated; hydrocarbon samples can be frozen. Samples should be shipped or delivered to a Sample Intake Center within 2 days.

If placing sediment in more than one jar, or if compositing samples from more than one location, the sample must be mixed before placing in the jar(s). This should be performed in a disposable aluminum pan, on aluminum foil, or on other disposable, non-contaminating material.

2.8 Sample Collection Documentation

The field crew will adhere to the following procedures:

The individual who collected the sample will be specified on the field data form. If more than one person, list the field party leader and the person who entered the data (if different).

Sample IDs will be clearly listed under each category. If no samples of a given type are taken, write "none". Sample identifications (IDs) should be assigned in accordance with the instructions in the **NOAA Field Sampling Workbooks** (available on the case's FTP site).

Samples must also be recorded in the appropriate case-wide NRDA Sample Collection Form (also available on the case's FTP site).

Field duplicates will be clearly marked and will be assigned a new sample number distinct from the original duplicated sample. On the sample form, use the Sample QA/QC Type column to indicate that the sample is a duplicate. The associated parent sample number can be identified in the Sample Notes column (the entire Sample ID should not be required in most situations since the location ID, matrix, and data should be the same).

If a particular type of sample is not collected at a site, enter "none" for that sample type.

2.8.1 Chemistry Sample Labeling and Documentation

- Prepare sample labels following sample ID protocol provided in the instructions from the trustee data management team.
- Affix sample ID labels to each container and cover with clear tape wrapped around the entire container circumference.
- Apply tape around lid to secure.
- Note collection of sample both in the **SAV Site Characterization Form (Appendix A)** and in the **NRDA Sample Collection Form for Soils and Sediments**.
- Field duplicates should be clearly marked as separate samples, so should be assigned a new sample number distinct from the original duplicated sample. On the sample form, use the Sample QA/QC Type column to indicate that the sample is a duplicate. The associated parent sample number can be identified in the Sample Notes column (the entire Sample ID should not be required in most situations since the location ID, matrix, and data should be the same).
- Preserve all original field notebooks, forms, and notes, which should be signed and dated. If crossing out or correcting any entries, date and initial when making the changes. Documentation is critical; original records will be gathered and kept on file by the trustees.

2.9 Sample Handling and Shipping

All collected samples will be transferred to the sample intake team. Field sampling crews will follow NRDA protocol documents for specific sample shipping and notification/sampling documentation instructions.

2.9.1 Preservation/Holding Times

All chemistry samples will be placed immediately in coolers and kept at 4°C. Samples will be transferred to the sample intake team to be frozen as soon as possible (for sediment and tissue chemistry samples). Water samples will be analyzed immediately due to holding time limitations, while sediment and tissue samples collected for VOC and PAH analyses will be archived. Sediment samples collected for nutrient analyses will be analyzed within the 28-day holding time.

Please see the Analytical Quality Assurance Plan for the MS Canyon 252 (Deepwater Horizon) Natural Resource Damage Assessment (QAP) for further details on storage and holding times.

3.0 COST ESTIMATE

A cost estimate for development of the work plan and implementation of the field work described herein is provided in Appendix C.

4.0 REFERENCES

Analytical Quality Assurance Plan for the MS Canyon 252 (Deepwater Horizon) Natural Resource Damage Assessment (QAP)

Carlson, P., N. Cosentino-Manning, E. DiDonato, M. Fonseca, K. Heck, J. Kenworthy, S. Meehan, A. Uhrin, L. Yarbro. 2010. Mississippi Canyon 252 Incident Submerged Aquatic Vegetation Tier 1 Pre-Assessment Plan Pre-Impact Baseline Characterization. Prepared for the MC 252 NRDA Submerged Aquatic Vegetation Technical Working Group, July 2010.

Poirrier, M.A., K. Burt-Utley, J.F. Utley, E.A. Spalding. 2009 An Inventory and Assessment of the Distribution of Submersed Aquatic Vegetation at Jean Lafitte National Historical Park and Preserve, New Orleans, April 2009.

USEPA, 2002, National Water Quality Inventory: 2000 Report, U.S. Environmental Protection Agency Report EPA–841–R–02–001, Washington, D. C.

USEPA. 2006a. *Guidance on Systematic Planning Using the Data Quality Objectives Process*. *EPA QA/G-4*. EPA/240/B-06/001. U.S. Environmental Protection Agency, Office of Environmental Information, Washington, D.C.

USEPA. 2006b. *Guidance for Data Quality Assessment: Practical Methods for Data Analysis. EPA QA/G-9*. EPA/240/B-06/003. U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC.

APPENDIX A
SAV Data Form

SAV Site Characterization Form #1 [*Page 1 of 2*]

Survey Team ID: _____

Field Crew Leader: _____ _____

Data Entry: _____ _____
(Name) (Agency)

1. Site Descriptors

Site Name/ID:_____ Lat:_____ Lon:_____
Time:_____ Date:_____
Habitat Setting (check one) ____ Intertidal _____ Subtidal (Depth (m) _____)
Bed size: _____ Width (m) _____ Length (m)
Location of samples with respect to bed:_____
Overall bed condition:_____
_____

2. Physical/Chemical Parameters

Bottom Salinity (ppt): _____ Air Temperature (C): _____ Conductance (S)_____
Bottom Temperature (C)_____ Bottom Dissolved Oxygen (mg/L):_____
Weather/Cloud Cover: _____ Wave height (m): _____
PAR (uEm^{-2}s^{-1}) :_____ Secchi depth (cm):_____
Irradiance: _____ (value 1) _____ (value 2) _____ (value 3)
Depth: _____ (value 1) _____ (value 2) _____ (value 3)

Oiled Condition (check one): _____ None _____ Sheen _____ Light
_____ Moderate _____ Heavy

3. SAV percent cover: ***Fill in table below, or check if visibility is too poor to estimate:*** **_____**

Species	Quadrat 1	Quadrat 2	Quadrat 3
Overall			

Flowering shoots: _____yes* _____no * if yes quantify_____

SAV Site Characterization Form #2 [*Page 2 of 2]*

Site Name/ID:_____ Lat:_____ Lon:_____

Date:_____ Survey Team ID: _____

4. Point Sample Collection and Disposition

The following subsamples were collected [list all sample IDs for each, indicating any that are field duplicates, as well as geographic coordinates in decimal degrees]

Sediment samples for contaminant analysis:

Sample ID	Latitude	Longitude

Sediment samples for grain size analysis:

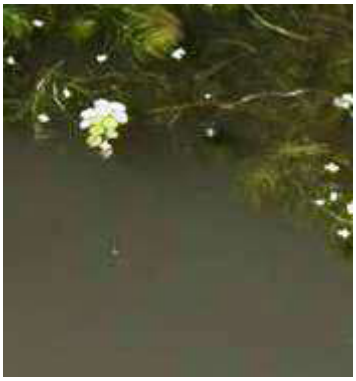
Water samples for contaminant analysis:

Vegetation samples for contaminant analysis:

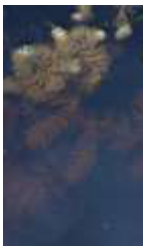
Other (Please Describe):_____

List of Photographs

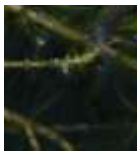
APPENDIX B
JELA SAV Species Photographs



Ceratophyllum demersum



Najas guadalupensis



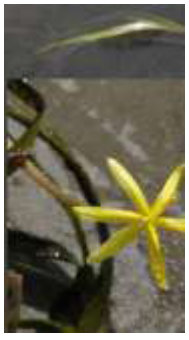
Myriophyllum spicatum

***Myriophyllum aquaticum* (parrot-feather)**

Hydrilla verticillata

Vallisneria Americana

Potamogeton pusillus



Heteranthera dubia

Cabomba caroliniana

Zannichellia palustris

Salvinia molesta

Egeria densa
Not Pictured only small plants found in 4 location. Closely resembles *Hydrilla verticillata*

APPENDIX C
Cost Estimate

WESTON will complete the SAV surveys and sampling on a time-and-materials basis. The cost for the SOW is provided below.

	GSA Hrly Rate	NPS GSA Discounted Rate	SubTask .10 Jean Lafitte Work Plan	SubTask .20 Jean Lafitte Field Work	TOTAL HOURS	TOTAL COST
Principal/Vice President	$ [redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Principal Investigator	$ [redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Manager - MID	$ [redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Financial/Cost Analyst - Mid	$ [redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Environmental Scientist SR	$ [redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Environmental Scientist MID	$ [redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Environmental Scientist JR	$ [redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
QA/QC Specialist SR	$ [redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
TOTAL			**118**	**314**	**432**	
			[redacted]	[redacted]		[redacted]
INTERNAL DIRECT COSTS						
Digital Camera / Day	$ [redacted]			[redacted]		[redacted]
Trimble Pro GPS / Day	$ [redacted]			[redacted]		[redacted]
Ponar Grab / Day	$ [redacted]			[redacted]		[redacted]
YSI 6920 / Day	$ [redacted]			[redacted]		[redacted]
Secchi Disk / Day	$ [redacted]			[redacted]		[redacted]
Licor Light Meter	$ [redacted]			[redacted]		[redacted]
Van Dorn Water Sampler	$ [redacted]			[redacted]		[redacted]
TOTAL INTERNAL DIRECT COSTS			[redacted]	[redacted]		[redacted]
TRAVEL COSTS*						
AIR FARE (LAX to New Orleans, LA)	$ [redacted]	[redacted]	[redacted]	[redacted]		[redacted]
HOTEL	$ [redacted]	[redacted]	[redacted]	[redacted]		[redacted]
PER DIEM / DAY	$ [redacted]	[redacted]	[redacted]	[redacted]		[redacted]
VEHICLE RENTAL / DAY	$ [redacted]	[redacted]	[redacted]	[redacted]		[redacted]
MILEAGE				[redacted]		[redacted]
Cost SubTotal			[redacted]	[redacted]		[redacted]
G&A (6.00%)			[redacted]	[redacted]		[redacted]
TOTAL TRAVEL COSTS			[redacted]	[redacted]		[redacted]
TOTAL COST			[redacted]	[redacted]		[redacted]

The cost estimate assumes the following:

- Field survey labor costs are for three WESTON personnel.
- Field surveys will be completed within a six-day period.
- All chemistry sample containers will be provided by the sample handling team.
- The National Park Service will supply vessels.
- The cost estimate does not include analytical chemistry.

- As detailed in the budget spreadsheet provided as a separate file, the total costs for this scope of work totals [redacted]. The Parties acknowledge that this budget is an estimate, and that actual costs may be higher. BP's commitment to fund the costs of this work includes any additional reasonable costs within the scope of this work plan that may arise. The trustees will make a good faith effort to notify BP in advance of any such increased cost.

Mississippi Canyon 252 Oil Spill
Sampling and Analysis Plan for Jean Lafitte National Historic Park and Preserve Submerged Aquatic Vegetation Natural Resource Damage Assessment

APPROVED:

Department of Interior Trustee Representative: 5/5/11
Date

Louisiana Trustee Representative: 5/19/11
Date

BP Representative: 5/7/2011
Date